Vermetid Gastropods and Marine Intertidal Zonation

by

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In 1949, Dr. T. A. Stephenson and his wife, Anne, who had been studying marine life between the tide-marks for several years, proposed a zonation that has been widely accepted by marine ecologists. The strand was thus divided into: a) the Infralittoral Zone, for the area beyond extreme low water level; b) the Littoral Zone, from extreme low water to extreme high water; and c) the Supralittoral Zone, above that. As the infralittoral (or as some workers prefer, the sublittoral) zone is out of reach of the collector (unless he becomes a diver) and the supralittoral zone carries no truly marine life, the principal area available for study is the littoral zone, which the Stephensons would divide, again, into three parts, the Infralittoral Fringe, from extreme low water to the upper limit of large seaweeds, the Midlittoral Zone, from there to the upper limit of barnacles, and the Supralittoral Fringe, up to the upper limit of the Littorinas (or their equivalents where they are absent). These zones are based upon plant and animal communities, not upon physical factors such as tides, wind and wave conditions, temperature, etc. Of course, it is to be expected that local variations of the pattern will occur and that in some areas parts of the zones may be suppressed or in others that yet finer divisions might be possible.

The Stephensons have subsequently tested their scheme at several places, and their descriptive accounts of such regions as the Florida Keys, Nova Scotia, and Bermuda are recommended reading for the serious student. Their promised reports on our own West Coast (the Puget Sound area and La Jolla) will give us fresh insights into our area. The complexities of the physical factors involved in interpreting zonation have been stressed by such authors as Doty (1957) and Moore (1959), for the meeting of sea, air, and land provides anything but a simple situation, and it is one difficult to study. Although the Stephenson scheme has in general proved useful, one may wonder—because it was drawn up mainly from work along the temperate and warm-temperature coasts of the east and west Atlantic—whether it would apply along an arid tropical coast such as we have in parts of West Mexico.

I had an opportunity to observe such a region last November, when I was a guest of the Belvedere Foundation, on a three-day trip to the southern end of Lower California. Not expecting to find good collecting grounds in so short a stay, I went with the intention of studying zonation if it were observable and of watching for my pet gastropods, the vermetids. In an earlier experience at Punta Peñasco, I had gained the impression that our common temperate intertidal invertebrates were almost entirely replaced by other forms and that zonation was not clear-cut. This proved to have been a superficial judgment, for in the La Paz area I saw the three-fold divisions of the midlittoral zone even more sharply displayed than they are along Californian shores. However, the physical factor of extreme dessication under a tropical sun in an atmosphere of low humidity erases most or even all green algae above the infralittoral level, leaving a thin and spotty veneer of the more hardy coralline algae. In spite of the sparse algal pasture, littorines are present on the rocks, and barnacles of two or three kinds cluster below them. What I had not been prepared to find (judging by the battered and decrepit specimens most collectors had brought back) was that at the upper edge of the midlittoral zone, among and just below the barnacles, there was a dense band of vermetids of several species and genera. They formed a conspicuous feature at nearly every spot we examined. This was in harmony with observations made in the Atlantic by the Stephensons, and it points up their comment that not only have the vermetids been neglected as intertidal organisms but that they may prove to be much more significant than we have realized when means for properly identifying them are made available.

A complete monograph on Panamic province vermetids is a long-term project, and in three days I could not hope to acquire

more than a sample, but what I did collect, with the loyal help of other members of the party (our plane's pilot even suffered a painfully bruised finger while chipping vermetids from a wharf pile for me) and what has subsequently been collected by Dr. S. S. Berry, Mr. James McLean, and others at my request on the east side of the Gulf, has enabled the completion of a review of the family. This is based primarily on type material at the British Museum, supplemented by the newly-collected specimens, in which soft parts may be examined. The revision is now in press and will appear as a Bulletin of the British Museum (Natural History). It departs in several respects from the tentative one in my book, Sea Shells of Tropical West America, because proper study of the type specimens was not possible until after the book was printed. A conclusion to be drawn from this revision is that the Gulf of California is one of the rich areas — if not the richest — in the world for genera and species of Vermetidae. Several unnamed forms have already come to light, one new Dendropoma having been taken by our party at Cape San Lucas. Many more are to be expected once we stop trying to fit every form we collect into the shopworn pigeonholes of "Aletes centiquadrus" or "Bivonia contorta" -- the two names most frequently used.

One observation that I hope will be given further scrutiny by workers who visit other parts of the West Mexican coast is that there seems to be a difference in relative abundance of the vermetid genera in relation to their feeding habits. Serpulorbis, which is a mucus feeder, attached to rocks either in a planorboid coil or in tightly attached but loosely wound or nearly straight tubes, prefers more quiet water, such as the upper ends of rocky coves. It may occur offshore in several feet of water; intertidally it is most evident in the infralittoral fringe near the lower edge of the barnacle zone. The rocks near La Paz and on Espiritu Santo Island were covered with it. Petaloconchus (Macrophragma), which is apparently both a mucus and a ciliary feeder, can tolerate more vigorous surf. At Cape San Lucas, it predominated and formed a black band nearly a foot wide on the rocks, again just below the barnacles. On the most surf-beaten rocks of all, at and near Cape San Lucas, the new species of Dendropoma occurred. This genus is, elsewhere in the world, a ciliary feeder. In places, as in South Africa and Bermuda, individuals are massed into such dense colonies as to form a solid veneer several inches wide at a fixed level, which may even extend for miles along a coast. The genus Aletes seems to be commoner offshore. Anatomy and habits of the animal have not been investigated, but the presence of an operculum suggests ciliary feeding, at least in part, although the form of the shell simulates that of Serpulorbis.

Obviously, much more work needs to be done before we can assess the full value of the vermetids in intertidal zonation, but these few observations, coupled with those of workers elsewhere, do suggest that the vermetids may, like the barnacles, serve as good horizon markers in our study of vertical distribution along the rocky shore.

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